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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 21

Application Number: 09/228,694
Filing Date: January 12, 1999
Appellant(s): PANDYA ET AL.

Peter F. Corless
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 17, 2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1-34 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

A substantially correct copy of appealed claims 1-34 appears on page 22-29 of the Appendix to the appellant's brief. The minor errors are as follows: In claim 6, lines 1-2, appellant recites "a structure of the following Formula II:". However, instead, it should be "a structure of Formula II:". In claim 8, line 1-2, appellant recites "a structure represented by the following Formula III:". However, instead, it should be "a structure of Formula III:". In claim 8, second line from the bottom, appellant recites "mole percents".

However, instead, it should be "mole fractions". In claim 18, line 1-2, appellant recites "a structure represented by the following Formula I:". However, instead, it should be "a structure of Formula I:". In claim 18, in the second repeating unit of the Formula I, the "-$(R^1)_m$" moiety should be omitted. The claim dependency of claim 20 should be changed from "claim 18" to "claim 17". In claim 25, on the first line after the chemical formula, appellant recites "R is optionally substituted;". However, instead, it should be "R is optionally substituted alkyl;".

(9) Prior Art of Record

5,844,057	WATANABE ET AL	12-1998
EP 0 780 732 A2	URANO ET AL	6-1997
JP 6-49137	WATANABE ET AL	2-1994

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. CLAIMS 23, 27, AND 29 ARE REJECTED UNDER 35 U.S.C. 112, SECOND PARAGRAPH, AS BEING INDEFINITE FOR FAILING TO PARTICULARLY POINT OUT AND DISTINCTLY CLAIM THE SUBJECT MATTER WHICH APPLICANT REGARDS AS THE INVENTION.

In claim 23, which depends from the claim 20, appellant recites the limitation "z" on the first line. There is insufficient antecedent basis for this limitation in the claim (i.e., claim 20 does not have variable z in the formula IV).

In claim 27, appellant recites, " . . . wherein the sum of w, x and y is at least about 90 percent of total units of the polymer." Also, claim 29 recites, " . . . wherein the sum of w', x', y' and z' is at least about 90 percent of total units of the polymer." It is unclear whether applicants mean 90 *mole percent* or 90 *percent by weight.*

For the purpose of examining the claims 27 and 29 on the merit, the Examiner assumed that appellant meant to claim the sum of w, x, and y (and the sum of w', x', y', and z') being at least about 90 *mole percent* of total units of the polymer (just as in present claim 5).

B. CLAIMS 1-34 ARE REJECTED UNDER 35 U.S.C. 103(A) AS BEING UNPATENTABLE OVER WATANABE ET AL (5,844,057).

Watanabe et al teach a chemically amplified positive resist composition containing a polymer having recurring units of hydroxyphenyl groups and acid labile group and a photoacid generator. See particularly, col.2, lines 8-25, col.5, lines 24-67, col.6, lines 1-26, lines 43-45, lines 61-67, col.7, lines 60-65, col.19, lines 29-51.

With respect to present claims 1, 2, 10, 11, 17, 20, 22, 24, and 34, in the formula (3) shown in col.6 of the prior art, it is indicated that the hydroxyl group can be located anywhere on the phenyl ring of the second repeating unit (the one denoted by the mole fraction variable q), which means that the hydroxyl group can be located at the meta, para or ortho position of the phenyl ring. Also, the variable m can be 1, 2, or 3. Therefore, one of ordinary skill in the art would have immediately envisaged some of the recurring units q having a single meta-hydroxy group on the phenyl ring and some other

recurring units q having a single para-hydroxy group on the phenyl ring. Also for the last repeating unit in the same formula, R^5 can be -COOX wherein X is a hydrogen or acid labile group. As examples of the acid labile group, Watanabe et al list six examples one of which is a normal, branched or cyclic alkyl groups of 1-6 carbon atoms (see col.6, lines 21-26), and as specific examples for the normal and branched alkyl groups, the prior art lists seven examples one of which is a tert-butyl group (see col.6, lines 42-45). Since there are only six examples for the acid labile group, it would have been obvious to one of ordinary skill in the art to choose (as a matter of choice) the normal, branched or cyclic alkyl groups of 1-6 carbon atoms to be the acid labile group, i.e., X in the -COOX moiety with a reasonable expectation of achieving a resist components improved in sensitivity, resolution, and latitude of exposure. Also, since there are only seven examples for the normal, branched or cyclic alkyl groups of 1-6 carbon atoms, it would have been obvious to one of ordinary skill in the art to choose (as a matter of choice) a tert-butyl group to be the X in the -COOX moiety with a reasonable expectation of achieving a resist components improved in sensitivity, resolution, and latitude of exposure. When X is a tert-butyl group, then the R^5 in the last repeating unit of the formula (3) becomes -COO-(t-butyl), and the last repeating unit becomes the presently claimed *acrylate acid-labile groups*. Therefore, the prior art's polymer of the formula (3) would encompass the presently claimed polymer comprising an acrylate acid-labile group, a metahydroxyphenyl group, and a para-hydroxyphenyl group.

With respect to present claims 3, 4, 6, 18, 21, 25, and 26, since the present variable n of these claims can be zero (and the present variable m of the claim 25 can also be zero), the prior art's polymer of the formula (3) also teaches the presently claimed polymers of the claims 3, 4, 6, 18, 21, 25 and 26 as explained above.

With respect to the presently claimed S group-containing repeating unit in claims 8 and 28, the formula (3) shown in col.6 of the prior art indicates that R^3 of the $-OR^3$ group attached to the phenyl ring of the third repeating unit is an acid labile group. As the preferred examples for the acid labile group, Watanabe et al list six examples one of which is normal, and branched alkyl groups such as methyl, ethyl, propyl, isopropyl, n-butyl, iso-butyl, and tert-butyl groups. Since there are only six categories of acid labile group examples listed by Watanabe et al, it would have been obvious for one having ordinary skill in the art to choose (as a matter of choice) normal, and branched alkyl groups such as methyl, ethyl, propyl, isopropyl, n-butyl, iso-butyl, and tert-butyl groups to be the acid labile group, R^3, with a reasonable expectation of achieving the chemically amplified positive resist composition which is improved in sensitivity, resolution, latitude of exposure, and process adaptability over the conventional resist compositions. Appellant states on page 10 of the present specification that the suitable S groups include aromatic groups such as phenyl and that the phenyl group is optionally substituted with non-reactive groups such as alkoxy group. Therefore, the prior art, which says that $-OR^3$ attached to the phenyl ring can be methoxy, ethoxy, propoxy, isopropoxy, n-butoxy, iso-butoxy, and tert-butoxy (all of which are alkoxy groups), teaches the presently claimed S-group containing repeating unit.

With respect to present claims 5, 7, 12, 19, 23, and 27, Watanabe et al teach in col.7, lines 60-65 that the mole fraction of q (the repeating units that contain hydroxy groups) would be 0.2-0.95 whereas the mole fraction of s (the repeating units that contain acid labile group) would be 0-0.5. If one arbitrarily picks 0.9 for the mole fraction q and 0.05 for the mole fraction s, this will give the sum of q and s to be 0.95 (which is 95 mole %). Since this number overlaps with the presently claimed range of at least about 90 mole %, the prior art's teaching would have made the present range *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)

With respect to present claims 9 and 29, Watanabe et al teach in col.7, lines 60-65 that the mole fraction of t to be 0.05-0.8 which will give the sum of q, r, and s to be 0.2-0.95. Since the prior art range of 0.2-0.95 (20-95 mole %) overlaps with the present range of at least about 90%, the prior art's range would have made the present range *prima facie* obvious. See In re Wertheim, supra.

With respect to present claims 13-16 and 30-33, Watanabe et al teach in col.19, lines 29-39 that their resist composition (including the resin and the photoacid generator) is spin-coated onto a *silicon wafer*, exposed to actinic radiation, and developed to form a resist pattern. Therefore, the prior art teaches the present inventions of these claims. Especially, since appellant states on page 17 of the present specification that the composition may be applied over *silicon* or silicon dioxide wafers

for the production of *microprocessors* and other integrated circuit components, the prior art teaches the presently claimed substrate being the microelectronic wafer.

C. CLAIMS 1-34 ARE REJECTED UNDER 35 U.S.C. 103(A) AS BEING UNPATENTABLE OVER URANO ET AL (EP 0 780 732 A2).

Urano et al teach a composition comprising a polymer (b) represented by the formula [2] (shown on pg.7) and a substance which generates an acid on exposure to actinic radiation. The prior art also teaches a pattern forming process which comprises applying its resist material on a semiconductor substrate (such as a silicone wafer), exposing it to actinic radiation through a mask, and conducting development, and the prior art teaches the present inventions of the claims 1-34. See particularly, pg.5, lines 14-20, lines 28-29, lines 37-39, pg.6, lines 14-16, pg.7, lines 1-13, lines 45-50, pg.8, lines 4-6, pg.12, lines 14-17, pg.24, lines 58, pg.25, lines 1-3, lines 8-10, lines 12-17.

With respect to present claims 1, 2, 10, 17, 24 and 34, Urano et al's polymer (b) which is represented by the formula [2] shown on pg.7 contains a single -OH substituted styrene repeating units. Since the formula does not restrict the position of the hydroxy group on the phenyl ring, one of ordinary skill in the art would have immediately envisaged some of the styrene repeating units having the single hydroxy group on the meta position (and unsubstituted at other ring positions as presently claimed) and the rest of the styrene repeating units having the single hydroxy group on the para position. Therefore, the prior art's formula for the polymer (b) encompasses a polymer having meta-hydroxyphenyl group and a para-hydroxyphenyl group which is presently claimed.

In the third repeating unit in Urano et al's polymer (b), R^{21} is H atom or a lower alkyl group and R^{22} can be a *carboxyl group which may be esterified*, a cyano group or a phenyl group which may have one or more substituents. As examples for the *carboxyl group which may be esterified*, Urano et al teach methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, *butoxycarbonyl*, pentyloxycarbonyl and hexyloxycarbonyl. First of all, since there are only three kinds of example for the R^{22}, it would have been obvious to one of ordinary skill in the art to choose a carboxyl group which may be esterified (as a matter of choice) to be R^{22} with a reasonable expectation of achieving a resist material suitable for forming a pattern excellent in sensitivity, resolution, mask linearity and other properties. Second of all, since there are only six examples given for the carboxyl group which may be esterified, it would have been obvious to one of ordinary skill in the art to choose (as a matter of choice) the butoxycarbonyl group (an acid-labile group) to be the carboxyl group which may be esterified for the R^{22} with a reasonable expectation of achieving a resist material excellent in sensitivity, resolution, mask linearity and other properties, and when the R^{22} of the formula [2] is butoxycarbonyl group, the prior art's third repeating unit teaches the presently claimed *acrylate acid-labile groups*. Therefore, the prior art's formula [2] teaches the presently claimed polymer comprising an (acrylate) acid-labile group, a meta-hydroxyphenyl group and a para-hydroxyphenyl group.

With respect to present claims 3, 4, 6, 11, 18, 20-22, 25, 26, since the present variable n of these claims can be zero, and the present variable m of the claim 25 can

be zero also, the prior art's polymer having the formula [2] teaches the present inventions of these claims as explained above.

With respect to present claims 8 and 28, the prior art's polymer of formula [2] teaches the presently claimed repeating unit having the S group. In the prior art's formula [2], the first repeating unit (the one with the R^7-substituted phenyl group), R^7 can be a H atom, a lower alkyl group, a lower alkoxy group, an acyloxy group, a saturated heterocyclic oxy group, or R^8O-CO-(CH_2)-O- (see pg.6, lines 14-16). Since there are only six examples for the R^7 group, it would have been obvious to one of ordinary skill in the art to choose (as a matter of choice) a lower alkyl group or a lower alkoxy group to be the R^7 with a reasonable expectation of achieving a resist material excellent in sensitivity, resolution, mask linearity and other properties. On pg.10, lines 13-14 of the present specification, appellant states that a phenyl group optionally substituted with non-reactive groups such as halogen, alkoxy, alkyl is generally preferred S group. Therefore, the prior art's polymer having the formula [2] teaches the presently claimed repeating unit having the S group.

With respect to present claims 5, 7, 9, 12, 19, 23, 27, and 29, Urano et al teach that the first repeating unit (which corresponds to the presently claimed repeating unit having the S group of claims 8 and 28) of their polymer (b) having the formula [2] can be present in an amount of 10-50 mole % (see pg.12, line 10). This gives 90-50 mole % for the rest of the repeating units, i.e., sum of the repeating units that contain a single-meta hydroxyphenyl group, the repeating units that contain a single-para hydroxyphenyl group, and the repeating units that contain a butoxycarbonyl group. Since this range of

90-50 mole % overlaps with the presently claimed range of at least about 90 %, the prior art's range would have made the present range *prima facie* obvious. See In re Wertheim, supra.

With respect to present claims 13-16 and 30-33, the prior art teaches (see pg.25, lines 8-17) that their resist material is coated on a semiconductor substrate such as silicone wafer and that the coated layer is imagewise exposed patternwise to deep ultraviolet light and then developed to form a desired pattern on the substrate. Therefore, the prior art teaches the present inventions of these claims.

D. CLAIMS 17-18 ARE REJECTED UNDER 35 U.S.C. 102(B) AS BEING ANTICIPATED BY WATANABE ET AL (JPO ABSTRACT: JP406049137A AND DERWENT ABSTRACT: 1994-097835 - ENGLISH ABSTRACTS OF JP 06049137 A).

Watanabe et al teach (see the English abstracts and the formula (1)-(4) for the repeating units of the polymer shown on pg.2 of JP'137) a block copolymer of p-hydroxystyrene *and* m-hydroxystyrene whose -OH groups are *partially* substituted with t-butoxycarbonyl group (pendant acid-labile group), and thus the prior art's polymer teaches the present inventions of claims 17-18.

E. CLAIMS 1, 3, 5, AND 13-16 ARE REJECTED UNDER 35 U.S.C. 103(A) AS BEING UNPATENTABLE OVER WATANABE ET AL (JPO ABSTRACT:

JP406049137A AND DERWENT ABSTRACT: 1994-097835 - ENGLISH ABSTRACTS OF JP 06049137 A) IN VIEW OF WATANABE ET AL (5,844,057).

As discussed above, Watanabe et al (JP'137) teach a block copolymer of p-hydroxystyrene *and* m-hydroxystyrene which -OH groups are *partially* substituted with t-butoxycarbonyl group (pendant *acid-labile group*). With respect to present claims 1, 3, and 5, although Watanabe et al (JP'137) does not explicitly teach the presently claimed photoresist composition of these claims, the prior art does teach that their polymer is useful as resist material of high resolution for large-scale integrated circuit (*LSI*) (see the English abstracts). Another prior art, Watanabe et al ('057), which teaches a polymer comprising hydroxy-substituted phenyl group (some at meta, some at para position) and acid-labile groups (as discussed in paragraph 5 of this Office Action), teaches a photoresist composition containing the polymer and a photoacid generator (see col.1, lines 5-15 and col.2, lines 8-25). Watanabe et al ('057) teach that the polymer which is used as base resin for their photoresist composition is suitable as a fine pattern-forming material in the manufacture of ultra-*LSI*'s. Since the polymer of Watanabe et al (JP'137) and the polymer of Watanabe et al ('057) are very similar, and since Watanabe et al (JP'137) teach that their polymer is useful as resist material of high resolution for LSI, it would have been obvious to one of ordinary skill in the art to combine the polymer taught in JP'137 with a photoacid generator and use the composition as a fine pattern-forming material in the manufacture of LSI as taught by Watanabe et al ('057). Therefore JP'137 in combination with Watanabe et al ('057) teach the present

inventions of claims 1, 3, and 5 (with respect to present claim 5, for Watanabe (JP'137)'s polymer, the sum of present x, y, and z would be 100 mole percent of total units of the polymer).

With respect to present claims 13-16, Watanabe et al ('057) teach (col.19, lines 29-51) that their photoresist composition containing the polymer and a photoacid generator is spin-coated onto a silicon wafer, exposed to actinic radiation, and then developed with an aqueous base solution to form a resist pattern for the manufacture of LSIs. Therefore, it would have been obvious for one of ordinary skill in the art to follow Watanabe et al ('057)'s teaching and to spin-coat the photoresist composition containing the polymer of JP'137 onto a silicon wafer, expose, and then develop to form a resist pattern for the manufacture of LSIs because the polymers taught in both of these prior arts are very similar and the prior art JP'137 teaches that its polymer is useful as resist material of high resolution for LSI. Therefore, JP'137 in combination with Watanabe et al ('057) teach the present inventions of claims 13-16.

(11) Response to Argument

A. THE ISSUE ON APPEAL

ISSUE 1: Whether claims 1-34 are unpatentable under 35 U.S.C. 103 over Watanabe et al (5,844,057).

Appellant argues that Watanabe reports (in col.23 through 30) a polymer that has multiple ring substitution unlike appellant's independent claim 1 which specifically

recites a meta-hydroxyphenyl group which has a single meta-hydroxy moiety and is unsubstituted at other available ring positions. Appellant also argues that Watanabe does not suggest a polymer that contains an acrylate acid labile group as recited in Appellant's independent claim 24. Appellant argues that instead, Watanabe reports linking acid labile group onto phenolic groups.

The Examiner disagrees. First of all, Watanabe was cited for the polymer having the general formula (3) shown in col.6 of the prior art. In that formula, the second repeating unit (the *q* unit) contains *m* number of –OH groups wherein *m* can be 1, 2, or 3. Also, it is indicated from the formula that the –OH group can be located anywhere on the phenyl ring of the second repeating unit which means that the –OH group can be located at the meta, para or ortho position of the phenyl ring. Based on these teachings, one of ordinary skill in the art would immediately envisage some of the repeating units *q* to have a single meta-hydroxy group on the phenyl ring and the rest of the repeating units *q* to have a single para-hydroxy group on the phenyl ring since there are only a few choices in terms of number and positions of –OH groups that can be located on the phenyl rings (Watanabe never states that there cannot be two kinds of q repeating units each of which has different –OH substitutions (that is, different in numbers and positions of –OH group) on the phenyl ring; on the contrary, see Polymer 13 and Polymer 19 in col.25 and col.27 which include *q*1 and *q*2 repeating units, each of which has different –OH substitutions on the phenyl ring). Although none of the polymers listed in col.23 through 30 explicitly depicts a polymer with *q*1 repeating unit having a single meta-hydroxy group on the phenyl ring and *q*2 repeating unit having a

single para-hydroxy group on the phenyl ring, it was held in In re Mills and Palmer 176 USPQ 196 that non-preferred embodiments cannot be ignored, and even if the non-preferred embodiments are used, obviousness exists. Patentee, in the same manner as appellant, is not limited in his teachings to only the exemplified subject matter.

Secondly, Watanabe's formula (3) clearly teaches that R^5 of the last repeating unit of the formula can be –COOX wherein X can be an acid labile group. As examples for the acid labile group, Watanabe lists six examples one of which is a normal, branched or cyclic alkyl groups of 1-6 carbon atoms, and as specific examples for the normal and branched alkyl groups, the prior art lists seven examples one of which is a tert-butyl (that is, $-C(CH_3)_3$) group. Since there are only six examples for the acid labile group, it would have been obvious to one of ordinary skill in the art to choose the normal, branched or cyclic alkyl groups of 1–6 carbon atoms to be the acid labile group with a reasonable expectation of achieving a resist components improved in sensitivity, resolution, and latitude of exposure. Also, since there are only seven examples for the normal, branched or cyclic alkyl groups of 1-6 carbon atoms, it would have been obvious to one of ordinary skill in the art to choose a tert-butyl group to be the X in the –COOX moiety with a reasonable expectation of achieving a resist components improved in sensitivity, resolution, and latitude of exposure. When X is a tert-butyl group, then the R^5 in the last repeating unit of Watanabe's formula (3) becomes –COO(tert-butyl), and the last repeating unit becomes the presently claimed acrylate acid-labile group (also, see Polymer 11 in col.25 wherein the last repeating unit (the *s* unit) of Watanabe's formula (3) is shown to have $COOC(CH_3)_3$ moiety) Therefore, the Examiner disagrees

with appellant's argument that Watanabe does not suggest polymers that contain an acrylate acid labile group.

Therefore, for the reasons explained above, it has been shown that Watanabe's general formula (3) does encompass the polymer presently claimed by appellant.

ISSUE 2: Whether claims 1-34 are unpatentable under 35 U.S.C. 103 over Urano et al (EP 0 780 732 A2).

Appellant argues that Urano merely provides a general report of phenolic polymers and that the examples in the Urano document do not include a polymer having meta-substitution.

The Examiner disagrees. Urano teaches the polymer (b) represented by the formula [2], and the formula contains the single –OH substituted-styrene repeating unit *r*. Since the formula does not restrict the position of the –OH group on the phenyl ring, one of ordinary skill in the art would be able to envisage some of the styrene repeating units *r* to have a single hydroxy group on the meta position and the rest of the styrene repeating units *r* to have a single hydroxy group on the para position. Therefore, the prior art's formula for the polymer (b) encompasses a polymer having a meta-hydroxyphenyl group and a para-hydroxyphenyl group as presently claimed. Urano never states that there cannot be two different kinds of repeating units *r* each of which has different –OH substitutions (that is, different in positions of –OH group) on the phenyl ring. Although the specific examples (as listed in pg.13, line 53 through pg.14,

line 58) for the polymers of the formula [2] do not include a polymer having a meta-hydroxyphenyl group and a para-hydroxyphenyl group as presently claimed, the prior art states that the polymers represented by the formula [2] are not limited to those exemplified compounds, and furthermore, it was held in In re Mills and Palmer, supra that non-preferred embodiments cannot be ignored, and even if the non-preferred embodiments are used, obviousness exists. Patentee, in the same manner as applicant, is not limited in his teachings to only the exemplified subject matter.

ISSUE 3: Whether claims 17-18 are unpatentable under 35 U.S.C. 102(b) over Watanabe et al (JP 6-49137).

Appellant argues that Watanabe does not teach or suggest polymers having meta-hydroxyphenyl groups as appellant claims. Appellant also argues that the Watanabe document does not teach or suggest polymers that contain an acrylate acid labile group as recited in appellant's independent claim 24.

First of all, Watanabe's polymer shown on the first page of the Japanese document undoubtedly includes a para-hydroxy-substituted styrene repeating unit and a meta-hydroxy-substituted styrene repeating unit. Secondly, Watanabe et al (JP'137) was never used by the Examiner to reject present claim 24.

ISSUE 4: Whether claims 1, 3, 5, and 13-16 are unpatentable under 35 U.S.C. 103 over Watanabe et al (JP 6-49137) in view of Watanabe et al (5,844,057).

Appellant argues that the cited documents, even in combination, fail to teach or suggest the claimed invention by saying that Watanabe et al (JP'137) does not teach or suggest polymers having meta-hydroxyphenyl groups and that Watanabe'057 reports polymers that have multiple ring substitution.

The Examiner disagrees. As already explained above, the Japanese document clearly teaches a polymer that includes a para-hydroxy-substituted styrene repeating unit and a meta-hydroxy-substituted styrene repeating unit. Also, as explained above, Watanabe'057 does suggest a polymer having some of the repeating units *q* with a single meta-hydroxy group on the phenyl ring and the rest of the repeating units *q* with a single para-hydroxy group on the phenyl ring. As previously explained, the polymer of Watanabe (JP'137) and the polymer of Watanabe et al'057 are similar, and Watanabe (JP'137) teaches that their polymer is useful as resist material of high resolution for large-scale integrated circuit (LSI) and Watanabe et al'057 also teach that the polymer used as base resin for their photoresist composition (which contains the polymer and a photoacid generator) is suitable as a fine pattern-forming material in the manufacture of ultra-LSI's. Therefore, it would have been obvious to one of ordinary skill in the art to use the polymer taught in Watanabe (JP'137) together with a photoacid generator and use the composition as a fine pattern forming material in the manufacture of LSI as taught by Watanabe et al'057. Therefore, JP'137 in combination with Watanabe et al'057 teach the presently claimed inventions.

ISSUE 5: Whether claims 23, 27, and 29 are unpatentable under 35 U.S.C. 112, second paragraph.

For the reasons stated on the record, the 35 U.S.C. 112, second paragraph rejections on present claims 23, 27, and 29 still stand. Appellant agrees to amend the pertinent claims to obviate the rejections in the future. Upon such amendment, these 112 rejections will be dropped.

B. COMPARATIVE EXPERIMENTAL DATA OF RECORD FULLY REBUTS ANY *PRIMA FACIE* CASE UNDER SECTION 103 THAT MAY BE CONTEDED TO EXIST.

Appellant argues that the comparative data set forth in the Rule 132 Declaration of Dr. Pandya fully rebuts any *prima facie* case that may be contended to exist. Appellant also argues that a Declaration cannot be disregarded merely because additional tests would be desired by the Office and that all evidence must be considered, particularly in this case, where the evidence of record directly supports patentability.

Appellant's comparative results set forth in the Declaration has been carefully considered however found unpersuasive because the comparison was not made to the closest prior art (Watanabe et al'057 and Urano et al (EP'732)). An affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the

closest prior art to be effective to rebut a *prima facie* case of obviousness. See In re Burckel, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979) as cited in MPEP 716.02(e). One of the closest prior art example in this case would be the polymer of formula (3) in Watanabe et al'057 which contains the first repeating unit (since *t* has be a positive number), second repeating unit, and the last repeating unit having the acrylate-acid labile group. The other closest prior art example would be Urano's polymer of formula (2) which contains the first repeating unit, second repeating unit, and the last repeating unit containing the acrylate-acid labile group. Appellant's comparative experiment does not represent either of those closest prior art examples since none of the polymers used in the experiment contains the first repeating unit of Watanabe's polymer of formula (3) or the first repeating unit of Urano's polymer of formula (2).

It appears that a representative comparative experiment which would show unexpectedly superior results of adding a meta-hydroxyphenyl unit to a polymer containing para-hydroxyphenyl units and acid-labile units could include an experiment which compares (i) Watanabe's polymer of the formula (3) containing the first repeating unit, second repeating unit with *only a single para-hydroxy substituent*, and the last repeating unit containing the acrylate-acid labile group *vs.* (ii) Watanabe's polymer of the formula (3) containing the first repeating unit, second repeating unit *some of which has a single para-hydroxy substituent and some of which has a single meta-hydroxy substituent*, and the last repeating unit having the acrylate-acid labile group. Another representative comparative experiment could include an experiment which compares (i) Urano's polymer of the formula (2) containing the first repeating unit, second repeating

unit with *only a single para-hydroxy substituent*, and the last repeating unit containing the acrylate-acid labile group *vs.* (ii) Urano's polymer of the formula (2) containing the first repeating unit, second repeating unit *some of which has a single para-hydroxy substituent and some of which has a single meta-hydroxy substituent*, and the last repeating unit having the acrylate-acid labile group.

Also, for present claims 1 and 24, the comparison made in the Declaration was not commensurate in scope with the claimed invention (see MPEP 716.02(d)) because the experiments shown in the Declaration do not include the presently required component of claims 1 and 24, that is, a photoactive component or a photoacid generator.

C. EACH OF THE CLAIMS ON APPEAL IS SEPARATELY PATENTABLE.

Appellant argues that the prior art documents, whether considered alone or in combination, fails to teach or suggest the photoresist composition of claim 1. However, the Examiner already established on the record (and also above) that the cited prior arts do teach or suggest the photoresist of claim 1 (see the second paragraph under (10)B. above).

Appellant argues that claim 2 is separately patentable because of the further limitation that the polymer comprises pendant acrylate acid labile groups. However, such limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and

by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the second paragraph under (10)B. above and the second paragraph under (10)C. above.

Appellant argues that claim 3 is separately patentable because the cited documents fail to teach or suggest the photoresists of claim 1 where the polymer has a structure of the Formula I. However, present claim 3 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, line 60, col.6, lines 1-26, lines 43-45), by Urano et al (pg.7, lines 1-14, pg.8, lines 4-6), and also by Watanabe et al (JP'137) (see the chemical formula on pg.1, right hand column). Also, see the third paragraph under (10)B. above, the third paragraph under (10)C. above, and the first paragraph under (10)E. above.

Appellant argues that claims 4 and 5 are separately patentable in view of their respective additional limitations recited therein (i.e., claim 4 limits substitutent W to comprise an acrylate ester and claim 5 limits the sum of x, y, and z to at least about 90 mole percent of total units of the polymer). However, present claim 4 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (pg.7, lines 1-14, pg.8, lines 4-6), and present claim 5 limitation is taught by Watanabe et al'057 (col.7, lines 60-65), by Urano et al (pg. 12, line 10), and also by Watanabe et al (JP'137) (see the chemical formula on pg.1, right hand column). Also, see the second, third, and fifth paragraphs under (10)B. above, the second, third, and fifth paragraphs under (10)C. above, and the first paragraph under (10)E. above.

Appellant argues that claim 6 is separately patentable because the cited documents fail to teach or suggest the photoresist of the claim where the polymer has a structure represented by the Formula II. However, present claim 6 limitation is taught

by Watanabe'057 (col.5, lines 44-52, line 60, col.6, lines 1-26, lines 43-45) and by Urano et al (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the third paragraph under (10)B. above and the third paragraph under (10)C. above.

Appellant argues that claims 7 and 21 are separately patentable in view of the additional limitations recited therein (i.e., claim 7 limits the sum of w, x, and y to at least about 90 mole percent of total units of the polymer and claim 21 limits substituent R to a tert-butyl group, adamantly, tetrahydropyranyl, or norbornyl group). However, present claim 7 limitation is taught by Watanabe'057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Present claim 21 limitation is taught by Watanabe'057 (col.6, lines 20-26, lines 43-45) and by Urano (pg. 8, lines 4-6). Also, see the third and fifth paragraphs under (10)B. above and the second, third and fifth paragraphs under (10)C. above).

Appellant argues that claim 8 is separately patentable because the cited documents fail to teach or suggests the photoresist of that claim where the polymer has a structure represented by the Formula III which calls for tetrapolymers. However, present claim 8 limitation is taught by Watanabe'057 (col.5, line 42, col.6, lines 1-11, lines 20-26, lines 42-45) and also by Urano (pg.6, lines 14-16, pg.7, lines 1-12). Also see the fourth paragraph under (10)B. above and the fourth paragraph under (10)C. above.

Appellant argues that claim 9 is separately patentable in view of the additional limitation that the sum of w', x', y', and z' is at least about 90 mole percent of total units of the polymer. However, present claim 9 limitation is taught by Watanabe '057 (col.7,

lines 60-65) and by Urano (pg. 12, line 10). Also, see the sixth paragraph under (10)B. above and the fifth paragraph under (10)C. above.

Appellant argues that claim 10 is separately patentable because the cited documents fail to teach or suggest the photoresist of the claim where the polymer comprises a structure represented by the Formula IV. However, claim 10 limitation is taught by Watanabe '057 (col.5, lines 44-52, line 60, col.6, lines 1-26, lines 43-45) and by Urano et al (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the second paragraph under (10)B. above and the second paragraph under (10)C. above.

Appellant argues that claims 11 and 12 are each separately patentable in view of the additional limitations recited therein (i.e., claim 11 limits substituent R to a tert-butyl group, adamantly, tetrahydropyranyl, or norbornyl group, and claim 12 limits the sum of w, x, and y to at least about 90 mole percent of total units of the polymer). However, Present claim 11 limitation is taught by Watanabe'057 (col.6, lines 20-26, lines 43-45) and by Urano (pg. 8, lines 4-6), and present claim 12 limitation is taught by Watanabe '057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Also, see the second and fifth paragraphs under (10)B. above and the second, third, and fifth paragraphs under (10)C. above.

Appellant argues that claim 13 is separately patentable because the cited documents do not teach or suggest the method for forming a photoresist relief image recited in claim 13. However, present claim 13 limitation is taught by Watanabe '057 (col.19, lines 29-29) and by Urano (pg.25, lines 8-17). Also, see the seventh paragraph

under (10)B. above, the sixth paragraph under (10)C. above, and the second paragraph under (10)E. above.

Appellant argues that claim 14, which recites the further limitation that the substrate is a microelectronic wafer or a flat panel display substrate, is separately patentable. However, present claim 14 limitation is taught by Watanabe '057 (col.19, lines 29-29) and by Urano (pg.25, lines 8-17). Also, see the seventh paragraph under (10)B. above, the sixth paragraph under (10)C. above, and the second paragraph under (10)E. above.

Appellant argues that claim 15, which recites an article of manufacture comprising a substrate having coated thereon a photoresist composition of claim 1, is separately patentable. However, present claim 15 limitation is taught by Watanabe '057 (col.19, lines 29-29) and by Urano (pg.25, lines 8-17). Also, see the seventh paragraph under (10)B. above, the sixth paragraph under (10)C. above, and also the second paragraph under (10)E. above.

Appellant argues that claim 16, which recites that the substrate is a microelectronic wafer or a flat panel display substrate, is separately patentable. However, However, present claim 16 limitation is taught by Watanabe '057 (col.19, lines 29-29) and by Urano (pg.25, lines 8-17). Also, see the seventh paragraph under (10)B. above, the sixth paragraph under (10)C. above, and also the second paragraph under (10)E. above.

Appellant argues that claim 17 is separately patentable in that the prior art documents simply fail to teach or suggest the photoresist composition of the claim.

However, claim 17 is actually drawn to a polymer that comprises 1) acid labile groups; 2) meta-hydroxystyrene groups; and 3) a para-hydroxyphenyl group, wherein the meta-hydroxyphenyl groups each has a single meta-hydroxy moiety and is unsubstituted at other available ring positions, and present claim 17 is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the second paragraph under (10)B. above, the second paragraph under (10)C. above, and also the paragraph under (10)D. above.

Appellant argues that claim 18 is separately patentable because the cited documents fail to teach or suggest the photoresist or polymer of claim 17 where the polymer has a structure represented by the specified Formula I. However, present claim 18 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the third paragraph under (10)B. above, the third paragraph under (10)C. above, and also the paragraph under (10)D. above.

Appellant argues that claim 19 is separately patentable for the additional limitations recited therein (i.e., claim 19 limits substituent W to comprise an acrylate ester and also limits the sum of x, y, and z to at least about 90 mole percent of total units of the polymer). However, present claim 19 limitation is taught by Watanabe '057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Also, see the fifth paragraph under (10)B. above and the fifth paragraph under (10)C. above.

Appellant argues that claim 20 is separately patentable because the cited documents fail to teach or suggest the photoresist of the claim wherein the polymer has

a structure of the Formula IV. However, present claim 20 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the second paragraph under (10)B. above and the second and third paragraphs under (10)C. above.

Appellant argues that claims 22 and 23 are each separately patentable in view of the further limitations (that is, claim 22 further limiting substituent R to a tert-butyl group, adamantly, tetrahydropyranyl, or norbornyl group and claim 23 further limiting the sum of w, x, y, and z to at least about 90 mole percent of total units of the polymer). However, present claim 22 limitation is taught by Watanabe'057 (col.6, lines 20-26, lines 43-45) and by Urano (pg. 8, lines 4-6), and present claim 23 limitation is taught by Watanabe '057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Also, see the second and fifth paragraphs under (10)B. above and the second, third, and fifth paragraphs under (10)C. above.

Appellant argues that claim 25 is separately patentable because the cited documents fail to teach or suggest the photoresist of that claim where the polymer has a structure of the Formula II. However, present claim 25 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the third paragraph under (10)B. above and the third paragraph under (10)C. above.

Appellant argues that claims 26 and 27 are each separately patentable for the respective additional limitations recited therein (i.e., claim 26 limits substituent R to a tert-butyl group, adamantly, tetrahydropyranyl, or norbornyl group and claim 27 limits

the sum of w, x, and y to at least about 90 mole percent of total units of the polymer). However, present claim 26 limitation is taught by Watanabe'057 (col.6, lines 20-26, lines 43-45) and by Urano (pg. 8, lines 4-6), and present claim 27 limitation is taught by Watanabe '057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Also, see the third and fifth paragraphs under (10)B. above and the second, third, and fifth paragraphs under (10)C. above.

Appellant argues that claim 28 is separately patentable because the cited documents fail to teach or suggest the photoresist of the claim where the polymer has a structure of the Formula III. However, present claim 28 limitation is taught by Watanabe'057 (col.5, line 42, col.6, lines 1-11, lines 20-26, lines 42-45) and also by Urano (pg.6, lines 14-16, pg.7, lines 1-12). Also, see the fourth paragraph under (10)B. above and the fourth paragraph under (10)C. above.

Appellant argues that claim 29 is separately patentable for the additional limitation recited therein (i.e., claim 29 limits the sum of w', x', y', and z' to be at least about 90 mole percent of total units of the polymer). However, present claim 29 limitation is taught by Watanabe '057 (col.7, lines 60-65) and by Urano (pg. 12, line 10). Also, see the sixth paragraph under (10)B. above and the fifth paragraph under (10)C. above.

Appellant argues that claims 30 and 31 are each separately patentable because the cited documents do not teach or suggest the method for forming a photoresist relief image as recited in claims 30 and 31. However, present limitations of claims 30 and 31 are taught by Watanabe '057 (col.19, lines 29-39) and by Urano (pg.25, lines 8-17).

Also, see the seventh paragraph under (10)B. above and the sixth paragraph under (10)C. above.

Appellant argues that claims 32 and 33 are separately patentable because the cited documents do not teach or suggest a substrate having coated thereon a photoresist of the invention. However, present limitations of claims 32 and 33 are taught by Watanabe '057 (col.19, lines 29-39) and by Urano (pg.25, lines 8-17). Also, see the seventh paragraph under (10)B. above and the sixth paragraph under (10)C. above.

Appellant argues that claim 34 is separately patentable because the cited documents do not teach or suggest a polymer as recited in the claim. However, claim 34 limitation is taught by Watanabe et al'057 (col.5, lines 44-52, col.6, lines 1-11) and by Urano et al (EP'732) (pg.7, lines 1-14, pg.8, lines 4-6). Also, see the second paragraph under (10)B. above and the second paragraph under (10)C. above.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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sjl
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